

ONKYO SERVICE MANUAL

QUARTZ SYNTHESIZED TUNER AMPLIFIER MODEL TX-18



Black and Silver models

BUD, BUDN,UD	120V AC, 60Hz
BUG, UG	220V AC, 50Hz
BUQA	240V AC, 50Hz
BUW, UW	120 or 220V AC, 50/60Hz

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY MARK Δ ON THE SCHEMATIC DIAGRAM AND IN THE PARTS LIST ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE THESE COMPONENTS WITH ONKYO PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL.

MAKE LEAKAGE-CURRENT OR RESISTANCE MEASUREMENTS TO DETERMINE THAT EXPOSED PARTS ARE ACCEPTABLY INSULATED FROM THE SUPPLY CIRCUIT BEFORE RETURNING THE APPLIANCE TO THE CUSTOMER.

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ONKYO
AUDIO COMPONENTS

SPECIFICATIONS

AMPLIFIER SECTION

Power output:	30 watts per channel,min RMS,at 8 ohms, both channels driven,from 40Hz to 20kHz, with no more than 0.3% THD.
Musical Power Output:	2 × 72 watts at 4 ohms,1kHz (DIN) 2 × 52 watts at 8 ohms,1kHz (DIN)
Continuous Power Output:	2 × 40 watts at 4 ohms,1kHz (DIN) 2 × 33 watts at 8 ohms,1kHz (DIN)
Total Harmonic Distortion:	0.1% at 25W 0.1% at 1 watt output
IM Distortion:	0.1% at 25W 0.1% at 1 watt output
Damping Factor:	35 at 8 ohms
Frequency Response:	20-30,000Hz ± 1dB
RIAA Deviation:	20-20,000Hz ± 0.8dB
Sensitivity and Impedance:	Phono: 2.5mV/50kohms CD/Tape Play: 150mV/50kohms Tape Rec: 150mV/3.5kohms (Phono)
Phono overload:	150mV RMS at 1kHz,0.3% THD
Signal-to-Noise Ratio:	Phono: 85dB(at 10mV input, A weighted) 75dB(IHF A-202) CD/Tape: 95dB(A weighted) 80dB(IHF A-202)
Tone Controls:	Bass: ± 10dB at 100Hz Treble ± 10dB at 10kHz
Loudness(-30dB):	+7dB at 70Hz, +5dB at 10kHz

TUNER SECTION

FM:

Tuning Range:	87.50-108.00MHz(50kHz steps)	87.5-108.0MHz(100kHz steps)
Usable Sensitivity:	Mono: 12.4dBf, 2.3μV, IHF 1.2 μV, 75 ohms DIN Stereo: 2.5 μV,75 ohms	Mono: 12.4dBf, 2.3μV Stereo: 19.2dBf, 5.0μV
50dB Quieting Sensitivity:	Mono: 2.2 μV,75 ohms Stereo: 22μV,75 ohms	Mono: 18.2dBf, 4.5μV Stereo: 38.2dBf, 45 μV
Capture Ratio:	1.5dB	1.5dB
Image Rejection Ratio:	80dB	40dB
IF Rejection Ratio:	90dB	90dB
Signal-to-Noise Ratio:	Mono: 70dB Stereo: 65dB	Mono: 70dB Stereo: 65dB
Selectivity:	50dB DIN (±300kHz,40kHz Devi.)	
ACA:		55dB
AM Suppression Ratio:	50dB	50dB
Harmonic Distortion:	Mono: 0.15% Stereo: 0.30%	Mono: 0.15% Stereo: 0.30%
Frequency Response:	30-15,000Hz ±1.5dB	30-15,000Hz ±1.5dB
Stereo Separation:	40dB at 1kHz 30dB at 100-10,000Hz	40dB at 1kHz 30dB at 100-10,000Hz
Muting level:	17.2dBf, 2μV	17.2dBf, 4μV
Stereo Threshold:	17.2dBf, 2μV	17.2dBf, 4μV

AM:

Tuning Range:	522-1,611kHz(9kHz steps)	520-1,710kHz(10kHz steps)
Usable Sensitivity:	30μV	30μV
Image Rejection Ratio:	40dB	40dB
IF Rejection Ratio:	30dB	30dB
Signal-to-Noise Ratio:	40dB	40dB
Harmonic Distortion:	0.8%	0.8%

GENERAL

Dimensions(W×H ×D):	435 ×97×317mm 17-1/8" ×3-15/16"×12-1/2"	435 ×97×317mm 17-1/8" ×3-15/16"×12-1/2"
Weight:	5.7kg.,12.6lbs.	5.7kg.,12.6lbs.

Specifications and features are subject to change without notice.

SERVICE PROCEDURES

1.Replacing the fuses

For continued protection against fire hazard,replace only with same type and same rating fuse.

D (120V) model

Circuit no.	Part no.	Description
F501,F601	252059	4A(SS-2),Speaker protection
F901	252048	3A(ST-6),Primary

G (220V) and Q (240V) models

Circuit no.	Part no.	Description
F501,F601	252075	2.5A-SE-EAK,Speaker protection
F902	252073	1.6A-SE-EAK,Primary
F903,F904	252077	4A-SE-EAK,Secondary
F905	252070	1A-SE-EAK,Secondary

W (Worldwide) model

Circuit no.	Part no.	Description
F501,F601	252059	4A(SS-2),Speaker protection
F901	252048	3A(ST-6),Primary
F902	252073	1.6A-SE-EAK,Primary

2.Safety-check out

(Only U.S.A. model)

After correcting the original service problem,perform the following safety check before releasing the set to the customer.

Connect the insulating-resistance tester between the plug of power supply cord and nickel screw on the back panel.

Specifications: 3.3Mohm $\pm 10\%$ at 500V.

3.Step band selector switch

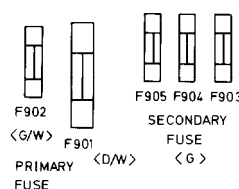
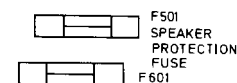
Worldwide models are equipped with a step band selector switch. This switch is located on the back panel. This switch is set to 50kHz (FM) and 9kHz (AM) at the factory, but may have to be reset to 100kHz and 10kHz depending on the area where the unit is used.

De-emphasis	FM step	AM step
Europe: 50 μ sec	50kHz	9kHz
U.S.A.: 75 μ sec	100kHz	10kHz

4.Change of voltage

Worldwide models are equipped with a voltage selector to conform with local power supplies. This switch is located on the back panel. Be sure to set this switch to match the voltage of the power supply in your area before turning the power switch on.

This switch is set to 220V at the factory. Voltage is changed by sliding the groove in the switch with the screwdriver to the right or left. Confirm that the switch has been moved all the way to the right or left before turning the power switch on.

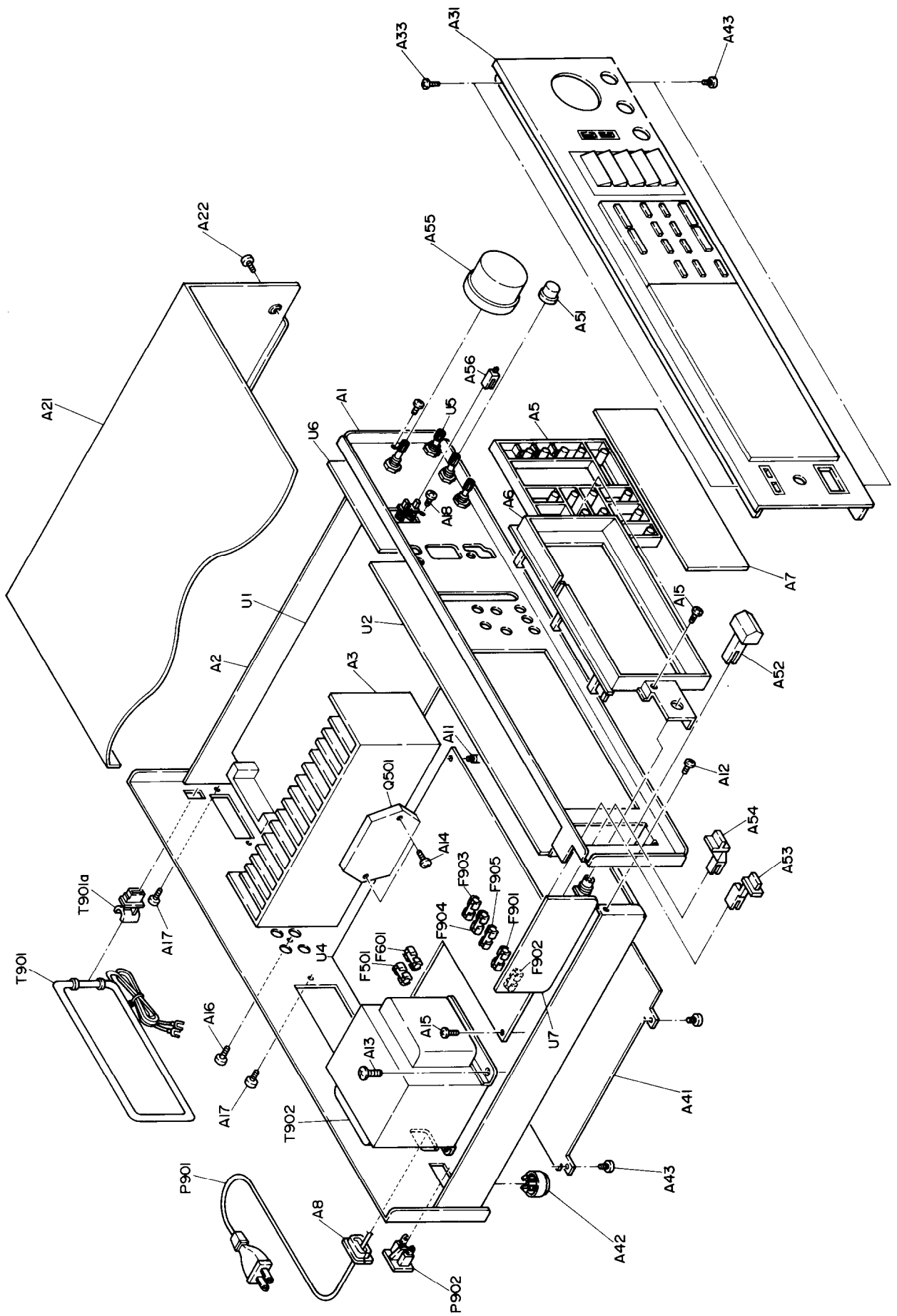


<fig.1>

5.Memory preservation

This unit does not require memory preservation batteries. A built-in memory power back-up system preserves contents of the memory during power failures and even when the unit is unplugged. The unit must be plugged in and the power switch turned on and off once in order to charge the back-up system. Note that since this is not a permanent memory,the power switch must be turned on and off a few times each month to keep the back-up system operative. The period of time during which memory contents are preserved after power has last been turned off varies depending on climate and placement of the unit. On the average, memory contents are protected over a period of 3 to 4 weeks (a minimum of 2 weeks) after the last time power has been turned off. This period is shorter when the unit is exposed to very high humidity or used in an area with an extremely humid climate.

EXPLODED VIEW



PARTS LIST

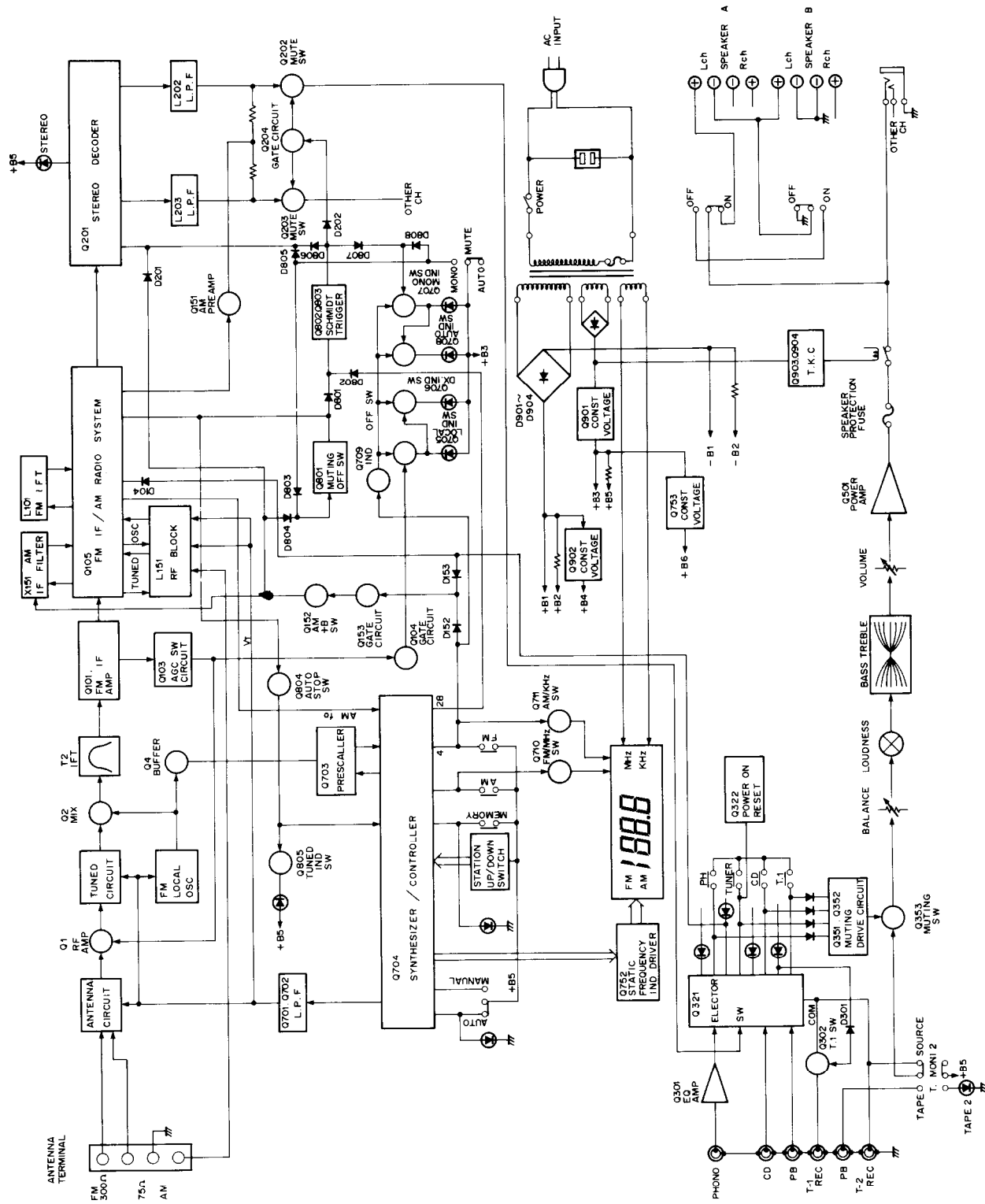
REF. NO.	PART NO.	DESCRIPTION	REF. NO.	PART NO.	DESCRIPTION
A1	27110273	Front bracket	U1	18668592-1	NARF-2592-1, FM/AM tuner pc board ass'y <D>
A2	27100090	Chassis <D>		18664592-1A	NARF-2592-1A, FM/AM tuner pc board ass'y <G/Q>
	27100093	Chassis <G>		18660592-1B	NARF-2592-1B, FM/AM tuner pc board ass'y <W>
	27100092	Chassis <W>	U2	18668593-1	NADIS-2593-1, Display circuit pc board ass'y <D>
A3	27100094	Chassis <Q>		18664593-1A	NADIS-2593-1A, Display circuit pc board ass'y <G/Q>
	27160183	Radiator		18660593-1B	NADIS-2593-1B, Display circuit pc board ass'y <W>
A5	28322486	Holder, Knob	U3	18660594-1	NASW-2594-1, Band selector switch pc board ass'y <W>
A6	2719345B	Holder	U4	18668595-1	NAAF-2595-1, Pri. and main amplifier pc board ass'y <D>
A7	28133161	Back palte		18664595-1A	NAAF-2595-1A, Pri. and main amplifier pc board ass'y <G/Q>
A8	27300750	Strainrelief	U5	18668596-1	NATC-2596-1, Tone control circuit pc board ass'y
A11	27190266	Holder	U6	18668597-1	NAVR-2597-1, Volume control pc board ass'y
A12	834430068	3TTS+6B(BC), Tapping screw	U7	18668598-1	NAHP-2598-1, Headphone terminal pc board ass'y <G/W/Q>
A13	830440089	4TTC+8C(BC), Tapping screw		18678598-1A	NAHP-2598-1A, Headphone terminal pc board ass'y <D>
A14	834430168	3TTS+16B(BC), Tapping screw			
A15	831130088	3TTW+8B, Tapping screw			
A16	834230108	3TTS+10B(Ni), Nickel screw			
A17	834430108	3TTS+10B(BC), Tapping screw			
A18	82143006	3P+6FN(BC), Pan head screw <W>			
A19	82143006	3P+6FN(BC), Pan head screw <W>			
A20	82142604	2.6P+4F(BC), Pan head screw <W>			
A21	28184267	Top cover <S>			
	28184268	Top cover 			
A22	834430068	3TTS+6B(BC), Tapping screw			
A31	18668121	Front Panel ass'y <S>			
A33	18678121	Front panel ass'y 			
A41	838430068	3TTB+6B(BC), Tapping screw			
A42	27170223	Bottom board			
A43	27175130	Leg			
	834430068	3TTS+6B(BC), Tapping screw			
			F501, F601	252059	4A(SS-2), Speaker fuse <D/W>
			F901	252075	2.5A SE-EAK, Speaker fuse <G/Q>
			F902	252048	3A(S-T-6), Primary fuse <D>
				252073 or 252073CC	1.6A SE-EAK, Primary fuse <G/W/Q>
			F903, F904	252077	4A-SE-EAK, Secondary fuse <G/Q>
			F905	252070	1A-SE-EAK, Secondary fuse <G/Q>
			P901	253123	AS-UC-6#18, Power supply cord <D>
				253128 or 253130	AS-CEE, Power supply cord <G/W>
			P902	253118	AS-SAA, Power supply cord <Q>
			Q501, Q601	25050290	NSCT-2P118T, AC outlet <D>
			S902	222044	STK-4151V, Power amplifier IC
				25065123	NPS-1258P, Voltage selector switch <W>
			T901	232119	NMA-3052, AM loop antenna
			T901a	27190105	Holder, antenna
			T902	2300076	NPT-912D, Power transformer <D>
				2300077	NPT-912G, Power transformer <G>
				2300078	NPT-912DG, Power transformer <W>
				2300102	NPT-912Q, Power transformer <Q>

<D>: Only 120V model
 <G>: Only 220V model
 <W>: Only Worldwide model
 <Q>: Only 240V model
 <S>: Only Silver model
 : Only Black model

NOTE: THE COMPONENTS IDENTIFIED BY MARK A
 ARE CRITICAL FOR RISK OF FIRE AND
 ELECTRIC SHOCK. REPLACE ONLY WITH
 PART NUMBERS SPECIFIED.

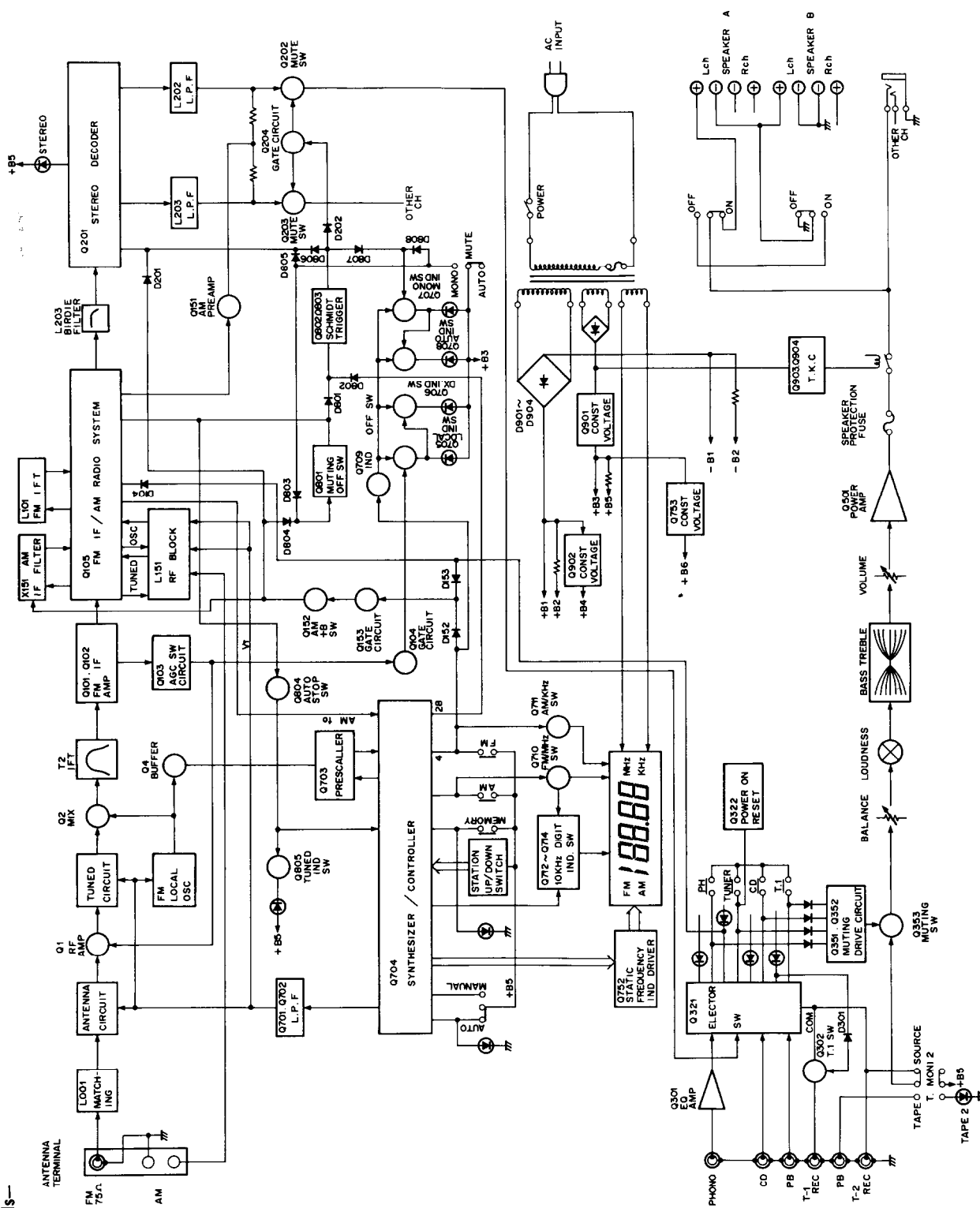
BLOCK DIAGRAM

–120V model–



BLOCK DIAGRAM

—220/240V models—



CIRCUIT DESCRIPTIONS

1.Synthesizer and controller operation

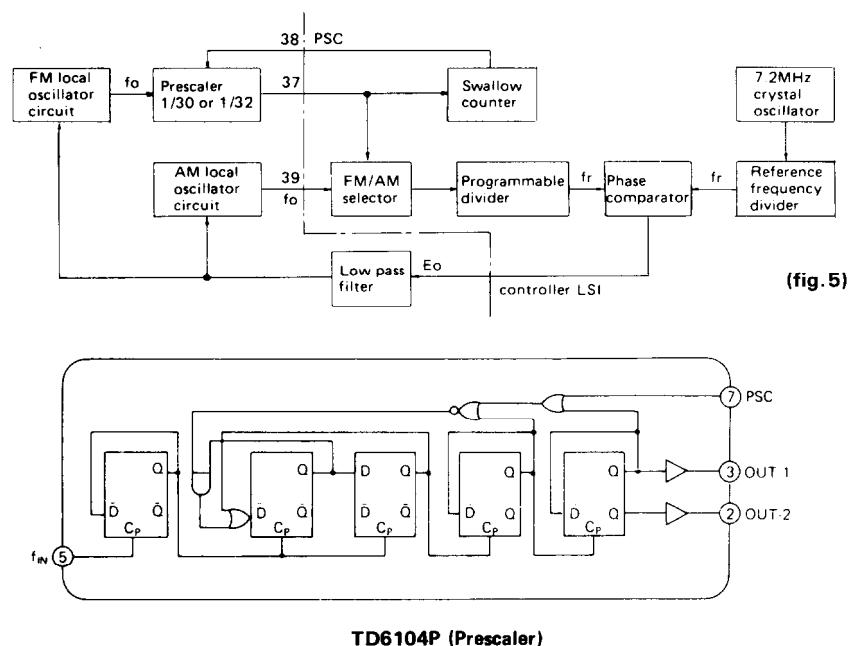
Pin No.	Symbol	Terminal	Description
1	GND	Ground	
2	XT	X'tal	Connected to the 7.2MHz crystal oscillator for the reference frequency.
3	XT		
4	FM	FM band specification input	Mutual reset type,performs switching of each band,FM/MW/LW.
5	MW	MW band specification input	
6	LW	LW band specification input	
7	MANUAL	Manual tuning mode specification input	Mutual reset type,performs auto search and manual operation mode switching during UP/DOWN tuning.
8	AUTO	Auto search tuning mode specification input	
9	UP	UP tuning key input	Connect the push key and perform UP/DOWN tuning.
10	DOWN	DOWN tuning key input	
11	STO	Memory store command input	The preset memory is set to the write mode when the key is pressed.
12~19	M1~M8	Preset memory channel specification input	Controls the write and read out of the internal 16-station preset memory along with the MC1 and MC2 input.
20	MC-1	Memory control input	Set the 16-station preset memory to the 8 FM/8 AM station mode or the FM/AM 2-band 16-station random mode.The 16-station random mode is used in this unit.
21	MC-2		
22	OSC2	AM oscillator terminal	CR connection terminal for the oscillator that determines the scan speed during the AM search mode.
23	OSC1	FM oscillator terminal	CR connection terminal for the oscillator that determines the scan speed during the FM search mode.
24	0/5	FM 50kHz output	Output that represents the 50kHz FM band tuning step for European models. Goes to the high level for the 50kHz setting.
25	CK2	Tuned frequency data output	Outputs the serial data and timing clock to the tuned frequency display driver.
26	CK1		
27	DATA		
28	MUTE	Muting signal output	Goes to the high level during muting output.
29	E2	Region specification input	See table 1.
30	E1		
31	STOP 3	AM IF signal input	During AM reception, this counts the IF signal and stops auto search.
32	STOP 2	Auto search stop signal input	When the stop 1 input (pin 33) is at the high level and this terminal goes to the high level, auto search is stopped.
33	STOP 1	Scan speed slow input	When the high level is input at this terminal, the auto search speed is cut in half.

Pin No.	Symbol	Terminal	Description
34	DO 1	Error output	Charge pump output of the phase detector which constitutes the PLL. High level is output when the divided oscillation frequency is high than the reference frequency. In the opposite case, low level is output. Floating occurs when the frequencies match. The output is applied to the variable capacitor diode in the front end through low pass filter Q701 and Q702. The output from both terminals is the same, but only DO1 is used.
35	DO 2		
36	TEST	Test terminal	Test mode at the high level.
37	FM IN	FM programmable counter input	Connect to the prescaler output (pin 3 of Q703)
38	PSC	Pulse swallow control output	Output to the control the division ratio of the prescaler.
39	AM IN	AM local oscillator signal input	Terminal for input of AM local oscillator signal.
40	INH	Inhibit input	Operates normally at the high level. Inhibit status at the low level.
41	INT	Initialize input	Operates normally at the high level. At the low level, the internal status is initialized.
42	Vdd	Power supply	Device power terminal: supplies 5V during the normal operation and 2.5V from the super capacitor (C715) for the memory preservation.

Table 1

E1 (Pin 30)	E2 (Pin 29)	Region	Band	Frequency range	Intermediate Frequency	Scan step	Reference Frequency
0	1	U.S.A	FM	87.5~108.0MHz	+10.7MHz	100kHz	25kHz
			AM 1	520 ~1710kHz	+450kHz	10kHz	10kHz
1	1		AM 2	522 ~1710kHz	+450kHz	9kHz	9kHz
1	0	Europe	FM	87.50 ~108.00MHz	+10.7MHz	50kHz	25kHz
			MW	522 ~1611kHz	+450kHz	9kHz	9kHz
			LW	153 ~360kHz	+450kHz	1kHz	1kHz
0	0	Japan	FM	76.0~90.0MHz	-10.7MHz	100kHz	25kHz
			AM	522 ~1611kHz	+450kHz	9kHz	9kHz

2.PLL tuned circuit



A block diagram of the tuned of the PLL is shown in fig. 5.

Operation during AM reception

The reception frequency is applied to the programmable divider where it is divided to $1/N$ and output as f_v . This is applied to the phase comparator where it is compared with frequency reference f_r (9kHz for G/W models and 10kHz for D model). If f_r and f_v differ, E_o equal to the difference in frequency is output. Since error output E_o is a pulse waveform, it is passed through the low pass filter to change it into DC voltage V_d , which is applied to the variable capacitor diode in the front end to change the reception frequency. This continues until f_v and f_r are the same and $E_o=0$.

Operation during FM reception

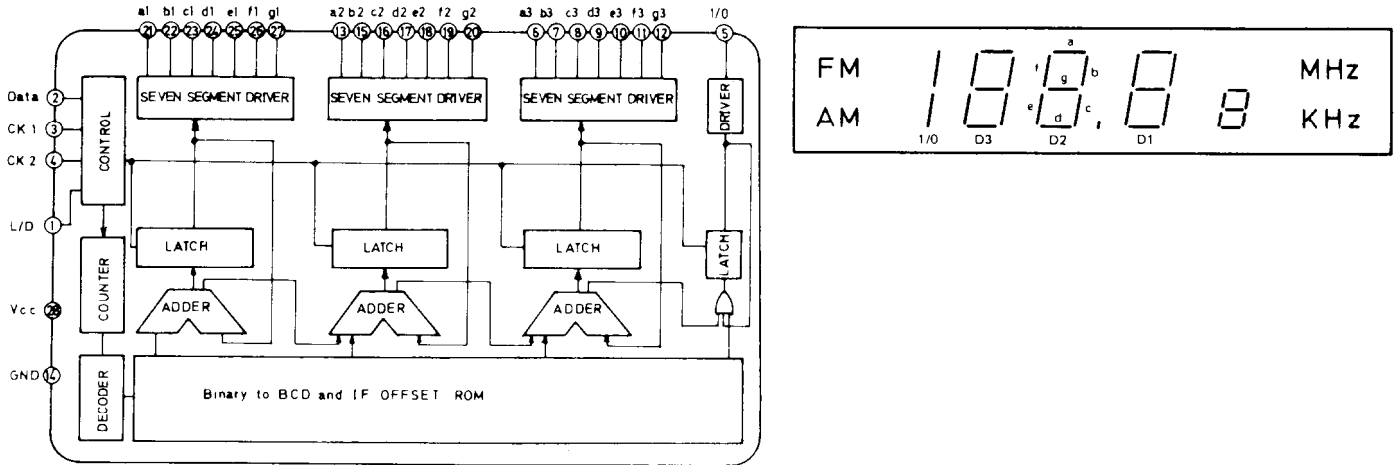
The pulse swallow method is used in the prescaler of this unit. In this type of prescaler, a supplementary number

(changed according to the program code input) and the divided reception frequency from the prescaler are combined in the control counter and the prescaler's division factor is switched $1/30$ or $1/32$ according to external control ($1/32$ when the PSC terminal is "H" and $1/30$ when it is "L").

The station oscillator frequency is applied to the programmable divider, but the programmable divider has an upper frequency limit of only 30MHz, so the pulse swallow-type prescaler, which can be used up to 150MHz, is inserted for division to $1/N_p$.

The signal is applied to the programmable divider and divided to $1/N$. The result is compared with a 25kHz frequency reference in the phase detector and error is output as E_o until a match is obtained as in AM operation.

3. Frequency indicator circuit



TD6301AP block diagram

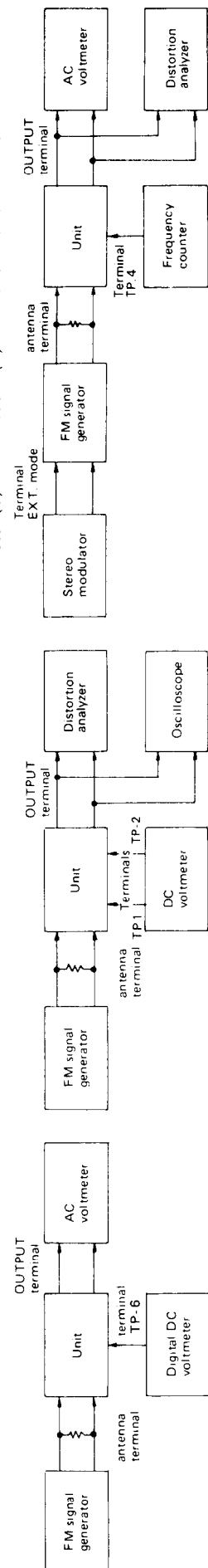
Pin No.	Terminal	Description
1	L/D	Output indication switching input terminal:Fluorescent display at the low level,and LED display at the high level.
2	Data	Tuned frequency data input terminal:Input from the system controller LSI to the serial.
3,4	CK1 CK2	Tuned frequency data input control timing input terminal: Transferred simultaneously with data from the system controller LSI.
5	I/O	Segment drive output terminal:Sets the number of display digit for FM(100MHz) and AM(1000kHz) reception.
6-12	a3-g3	Seven segment drive output terminal:Sets the number of display digit for FM(10MHz) and AM(100kHz) reception.
13, 15-20	a2-g2	Seven segment drive output terminal:Sets the number of display digit for FM(1MHz) and AM(10kHz) reception.
21-27	a1-g1	Seven segment drive output terminal:Sets the number of display digit for FM(100kHz) and AM(1kHz) reception.
14	Vcc	Power source terminal
28	Gnd	Ground

ADJUSTMENT PROCEDURES

FM section

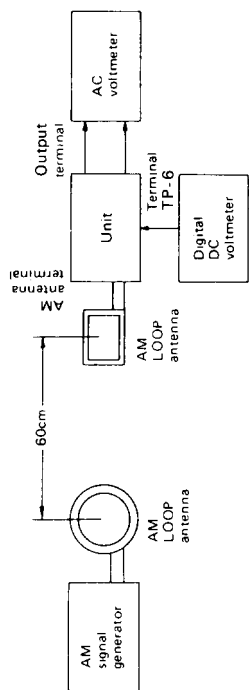
Item	Step	Connection of instrument	FM SG output	Stereo modulator output	Tuning frequency	Output indicator	Adjustment point	Adjust for	Remarks
Front end	1	Fig.1	—	—	88.0MHz	Digital DC voltmeter	T1(L5)	1.5V±0.4V	Usually not necessary to adjust.
	2		107.9MHz 1kHz, 75kHz devi.	—	107.9MHz	AC voltmeter	TC1, TC2(G) TC1(D)	Maximum output	
I F	1	Fig.2	99.0MHz 1kHz, 75kHz devi. 65dBf(60dB)	—	99.0MHz	DC voltmeter	L101 Primary	0V	Set the muting switch to OFF. Repeat the steps 1 and 2 until no further adjustment is necessary.
	2		—	—		Distortion analyzer	L101 Secondary	Minimum	
V C O		Fig.3	MONOaural 99.0MHz 1kHz, 75kHz devi. 65dBf(60dB)	NO STEREO SIGNAL	99.0MHz	Frequency counter	R215	19kHz±10Hz	Set the muting switch to ON.
Stereo distortion		Fig.3	99.0MHz Ext. modulation 65dBf(60dB)	L+R 1kHz 67.5kHz devi.	99.0MHz	Distortion analyzer	T2	Minimum	
Stereo separation	1	Fig.3	99.0MHz Ext. modulation 65dBf(60dB)	Lch. 1kHz	99.0MHz	Rch. AC voltmeter	R205	Minimum	Maximum and same separation
	2		—	Rch. 1kHz		Lch. AC voltmeter		Minimum	
Tuning indicator level	1	Fig.2	99.0MHz 1kHz, 75kHz devi. 29.2dBf(24dB)	—	99.0MHz	Tuning indicator	R156	Light on	
	2		99.0MHz 1kHz, 75kHz devi. 28.2dBf(23dB)	—				Light off	

Note: (G):220V model (D):120V and Worldwide models

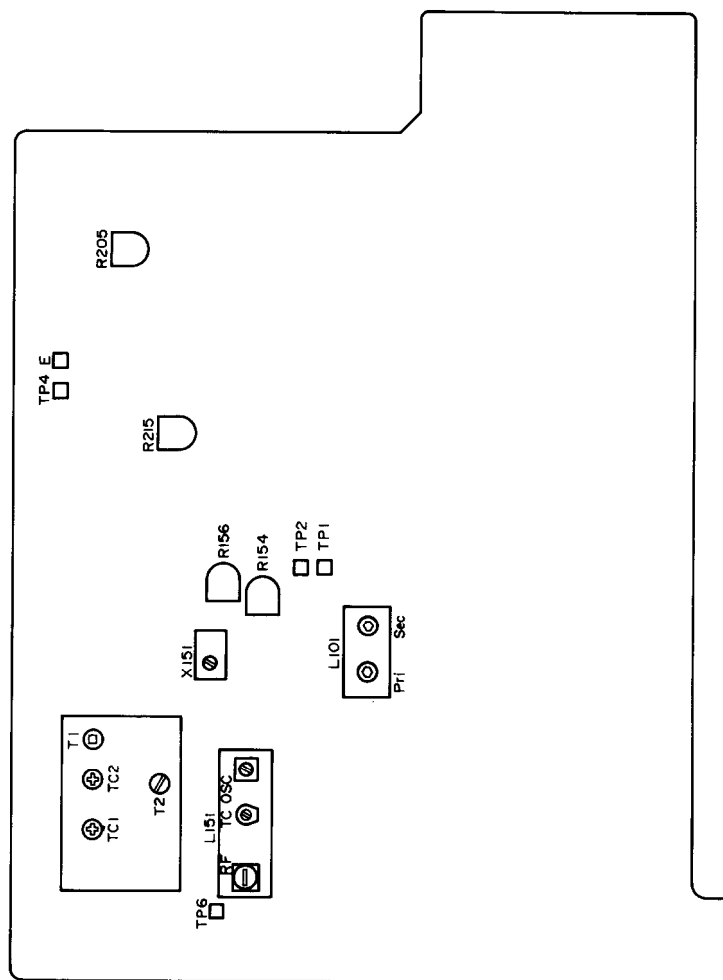


AM section

Step	AM SG output	Tuning Frequency	Output indicator	Adjustment point	Adjust for	Remarks
1	—	522kHz (520kHz)	Digital DC voltmeter	L151 OSC	1.2V \pm 0.1V	Usually not necessary to adjust.
2	603kHz, 60dB/m (600kHz) 400Hz 30% mod.	603kHz (600kHz)	A C voltmeter	L151 R F	Maximum	Repeat the steps 2 and 3 until no further adjustment is necessary.
3	1404kHz, 60dB/m (1400kHz) 400Hz 30% mod.	1404kHz (1400kHz)	A C voltmeter	L151 T C	Maximum	
4	999kHz, 30dB/m (1000kHz) 400Hz 30% mod.	999kHz (1000kHz)	A C voltmeter	X151	Maximum	
5	999kHz, 30dB/m (1000kHz) 400Hz 30% mod.	999kHz (1000kHz)	TUNED indicator	R154	Light on	

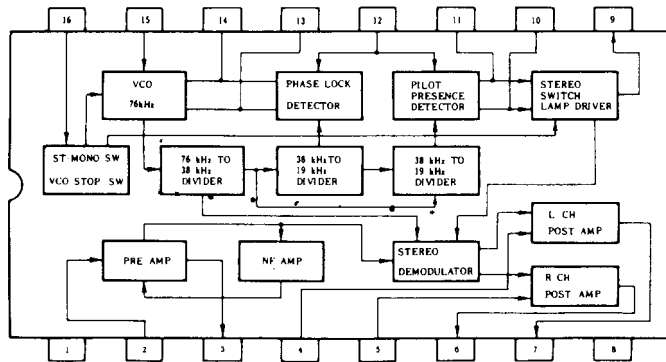


Note: () 120V model <10kHz step>

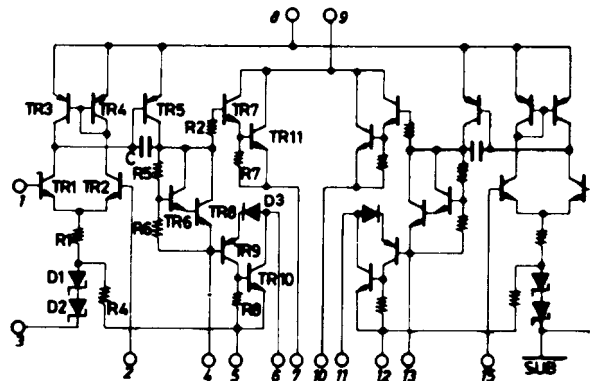


BLOCK DIAGRAM OF IC

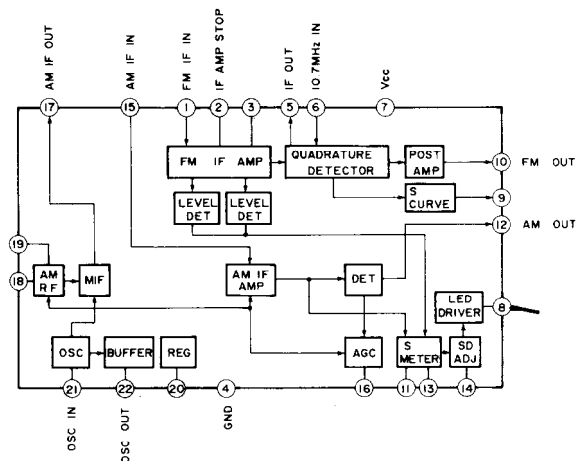
μ PC1161C3(Stereo decoder)



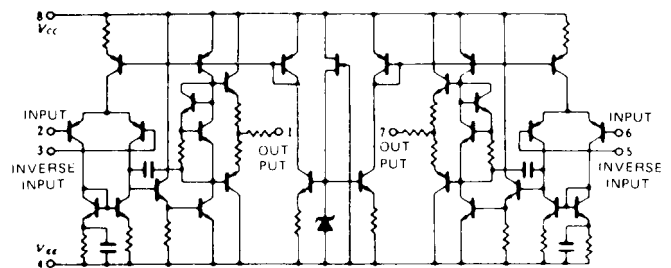
STK-4151V(Power amplifier)



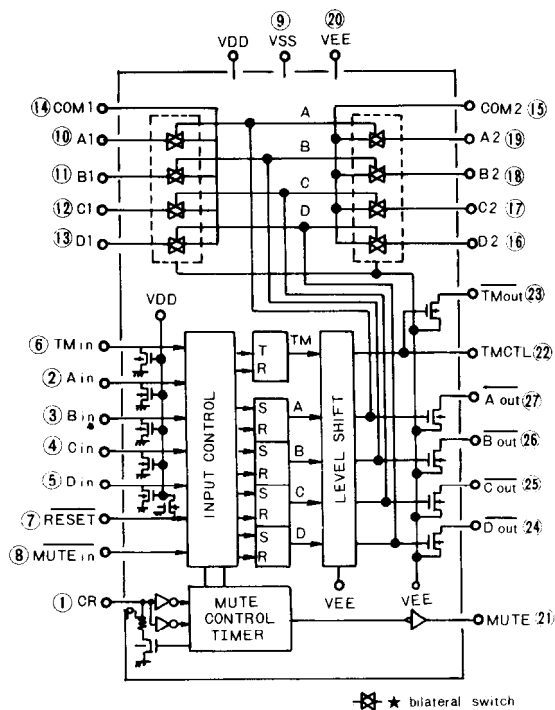
LA1265(AM radio/FM IF system)



NJM4558/4559(Operational amplifier)



LC7817(Analog switch)



★ ★ bilateral switch

PRINTED CIRCUIT BOARD-PARTS LIST

HEADPHONE TERMINAL PC BOARD(NAHP-2598-1/1A)

CIRCUIT NO.	PART NO.	DESCRIPTION
R551,R661	441522714	270ohm,1/2W,Metal oxide film resistor
S501,S502	25035517	NPS-222-L479,Push switch,Speaker
P502	25045184	HJL-0520-01-010,Headphone terminal <G/W>
	25045193	HJL-0521-01-010,Headphone terminal <D>

TONE CONTROL PC BOARD(NATC-2596-1)

CIRCUIT NO.	PART NO.	DESCRIPTION
Transistors		
Q351	2211255, 2210746 or 2212485	2SC1815(GR), 2SC945A(P) or JC501(Q)
Q352	2211455, 2210803 or 2212495	2SA1015(GR), 2SA733(P) or JA101(Q)
Q353,Q354	2212285 or 2212286	2SC2878(A) or 2SC2878(B)
Capacitors		
C361	352780109	1 μ F,50V,Elect.
C362,C462	352781099	0.1 μ F,50V,Elect.
Resistors		
R352	5146049	N16RLC250KWT30,Variable,Balance
R353,R453	5148073	N16RQMC110K180K30,Variable,Bass
R357,R457	5148102	N16RGMC219K30,Variable,Treble

DISPLAY PC BOARD(NADIS-2593-1/1A)

CIRCUIT NO.	PART NO.	DESCRIPTION
Fluorescent tube		
Q751	212016	FIP7B8CS
IC		
Q752	222673	TD6301AP
Transistor		
Q753	2211455, 2210803 or 2212495	2SA1015(GR), 2SA733(P) or JA101(Q)
L.E.Ds		
D341-D344	225137CG,	SEL2413ECG,
D751,D753	225137DG or	SEL2413EDG or
D754,D757	225137DY	SEL2413EDY
D345,D755	225142	SEL2913K
D756	225142	SEL2913K
D752,D758	225141	SEL2213C
Diodes		
D346-D348	223150,	1S1040,
D759	223124 or 223145	1S2473 or 1S2076TD
D760,D761	223150, 223124 or 223145	1S1040, 1S2473 or 1S2076TD <G/W>
D762	2243192 or 2239552	MTZ8.2A or RD8.2E-B2
Capacitor		
C751	352741009	10 μ F,16V,Elect.
Resistors		
R341,R342	441522024	2kohm,1/2W,Metal oxide film
R343	441628214	820ohm,1/2W,Metal oxide film
R757-R765	49121333409	33kohm \times 9,1/8W,Network
R766-R778	49121333413	33kohm \times 13,1/8W,Network
Switches		
S321-S324	25035389	NPS-111-S353
S325	25035515	NPS-142-L477
S751-S763	25035389	NPS-111-S353
Holder		
	27190434	L.E.D
Cushion		
	28140593	3.5 \times 10 \times 40mm

VOLUME CONTROL PC BOARD**VOLUME CONTROL PC BOARD(NAVR-2597-1)**

CIRCUIT NO.	PART NO.	DESCRIPTION
R371,R471	5104180	N16RGH100KBT30,Variable resistor,
Volume		
S351,S352	25035520	NPS-222-L482,Push switch

BAND SELECTOR SWITCH PC BOARD(NASW-2594-1)

Only Worldwide model

CIRCUIT NO.	PART NO.	DESCRIPTION
S371	25065267	NSS-22109,Slide switch

NOTE: <D>:Only 120V model
 <G>:Only 220V and 240V models
 <W>:Only worldwide model

PRINTED CIRCUIT BOARD-PARTS LIST

FM/AM TUNER PC BOARD(NARF-2592-1/1A/1B)

CIRCUIT NO.	PART NO.	DESCRIPTION	CIRCUIT NO.	PART NO.	DESCRIPTION
	Front end			Ceramic filters	
TU001	240061	FE349U14 <D/W>	X101,X102	3010071	SFE10.7MA5 <D/W>
	240059	FE416U33 <G>	X101	3010070	SFE10.7MS3GYA <G>
	ICs		X102	3010043	SFE10.7MM <G>
Q105	222912	LA-1265	X151	3010075	SFL450B3
Q201	222678	μ PC1161C3	X152	3010076	BFU450C
Q301,Q401	222502 or	NJM4558DX or		Capacitors	
	222534	NJM4559DX	C002	352780339	3.3 μ F,50V,Elect.
Q321	222923	LC7816	C107	352742209	22 μ F,16V,Elect.
Q703	222675	TD6104P	C108	352784799	0.47 μ F,50V,Elect.
Q704	222674	TC9147BP	C111	352741009	10 μ F,16V,Elect.
	Transistors		C112	352780229	2.2 μ F,50V,Elect.
Q101	2211722 or	2SC1923(R) or	C116	352782299	0.22 μ F,50V,Elect.
	2211723	2SC1923(O)	C152,C155	352741009	10 μ F,16V,Elect.
Q102	2210746	2SC945A(P) <G>	C156	352750479	4.7 μ F,25V,Elect.
Q103,Q104	2211255,	2SC1815(GR)	C157	352741009	10 μ F,16V,Elect.
Q152	2210746 or	2SC945A(P) or	C159	352780109	1 μ F,50V,Elect.
	2212485	JC501(Q)	C161	352780229	2.2 μ F,50V,Elect.
Q151,Q153	2211256	2SC1815(BL)	C162	352721019	100 μ F, 6.3V,Elect.
Q202,Q203	2212794,	2SD1468(R),	C201	352750479	4.7 μ F,25V,Elect.
	2211705 or	2SD655(E) or	C202	352744719	470 μ F,16V,Elect.
	2211706	2SD655(F)	C206,C207	352741009	10 μ F,16V,Elect.
Q204,Q322	2211455,	2SA1015(GR),	C208,C209	352780109	1 μ F,50V,Elect.
	2210803 or	2SA733(P) or	C210	352782299	0.22 μ F,50V,Elect.
	2212495	JA101(Q)	C212	352780339	3.3 μ F,50V,Elect.
Q302,Q402	2211945	2SK246(GR)	C213	352780109	1 μ F,50V,Elect.
Q701	2211255	2SC1815(GR)	C214	370134714	470pF \pm 5%,50V,APS
Q702	2212294 or	2SK108(D) or	C302	352780229	2.2 μ F,50V,Elect.
	2211293	2SK68(M)	C304	352721019	100 μ F, 6.3V,Elect.
Q705,Q707	2211255,	2SC1815(GR),	C308	352780229	2.2 μ F,50V,Elect.
Q709-Q711	2210746 or	2SC945A(P) or	C321	379122235	22,000pF \pm 10%,50V,Plastic <D/W>
Q801-Q805	2212485	JC501(Q)	C325,C326	352742219	220 μ F,16V,Elect.
Q706,Q708	2211256	2SC1815(BL)	C327	352784799	0.47 μ F,50V,Elect.
Q712,Q713	2211255,	2SC1815(GR),	C329	352750479	4.7 μ F,25V,Elect.
	2210746 or	2SC945A(P) or	C402	352780229	2.2 μ F,50V,Elect.
	2212485	JC501(Q) <G/W>	C404	352721019	100 μ F, 6.3V,Elect.
Q714	2211455,	2SA1015(GR),	C408	352780229	2.2 μ F,50V,Elect.
	2210803 or	2SA733(P) or	C702	352741009	10 μ F,16V,Elect.
	2212495	JA101(Q) <G/W>	C703	395160107	1 μ F,35V,Tantalum
	Diodes		C708	352734709	47 μ F,10V,Elect.
D101,D102	223132	1K60	C711	352780109	1 μ F,50V,Elect.
D104,D152	223150,	US1040,	C712	352780229	2.2 μ F,50V,Elect.
D153,D201	223124 or	1S2473 or	C713	352780479	0.47 μ F,50V,Elect.
D301,D401	223145	1S2076TD	C715	3020017	0.022F,5V,Super
D321-D324	223150,	US1040,	C801,C802	352741009	10 μ F,16V,Elect.
D701-D703	223124 or	1S2473 or	C951	352741009	10 μ F,16V,Elect.
D803-D808	223145	1S2076TD		Resistors	
D801,D802	223155	1SS138	R154	5215045	N08HR10KBC,Semi-fixed
D951	2243152 or	MTZ5.6B or	R156	5215062	N08HR30KBC,Semi-fixed
	2239472	RD5.6EB2	R205	5215048	N08HR200KBC,Semi-fixed <D/W>
	Coils			5215049	N08HR500KBC,Semi-fixed <G>
L001	233312	NMA-3051 <G>	R215	5215044	N08HR5KBC,Semi-fixed
L102	233105	NCH-1005	R951	441521114	110ohm,1/2W,Metal oxide film
L201	233236	NMC-6027 <G>		Socket	
L202,L203	233291	NMC-5039 <G>		25050273	NSCT-9P101
	Transformer			Terminals	
L101	233351	NFIF-4056	P301-P303	25045171	NPJ-4PDBL-65,Input/Output
	RF block		P901	25060085	NTM-4PDBL-65,Antenna <D/W>
L151	232128	NMRF-7043		25060087	NTM-2PDMN31,Antenna <G>
	X'tal			Bracket	
X701	3010073	XTL-7.2M		27141059	Ground

PRINTED CIRCUIT BOARD-PARTS LIST

POWER AMPLIFIER PC BOARD (NAAF-2595-1/1A/1B)

CIRCUIT NO.	PART NO.	DESCRIPTION
Q501, Q601 Q901	222044	STK-4151V
	222780/22	78N12
	Q902	Transistors
Q902, Q904	22112555	2SC1815(GR)
	Diodes	
	D901-D904	P3000DL or
D905, D906	223897 or	1N5402F
	22380003	MTZ15B or
	2243252 or	RD15E-B2
D907	2238672	DF02M
D908	223892	1N4003F or
	223896 or	GP101N4003
	223880	RD20E-B1,
D909	2239733,	MT220C or
	2243283 or	GZA20Y
	2241212	1SS138
D910	223155	RD3.3E-B1
D911	2241291	1SS138
D912-D914	223155	Coils
L501, L601	231001	S-1.3B <G>

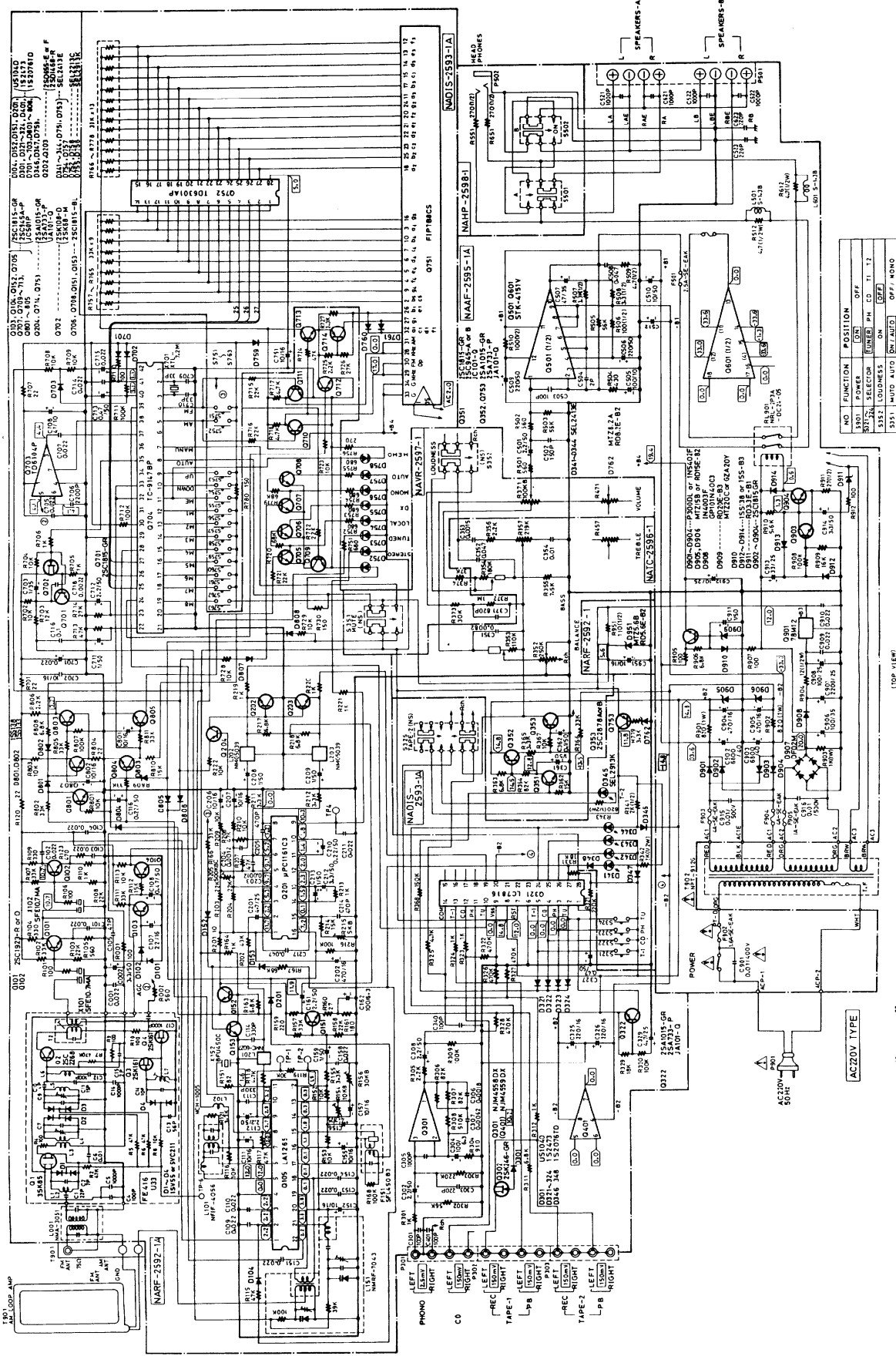
NOTE: THE COMPONENTS IDENTIFIED BY MARK Δ ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE ONLY WITH PART NUMBERS SPECIFIED.

CIRCUIT NO.	PART NO.	DESCRIPTION
Capacitors		
C501, C601	352780229	2.2 μF 50V Elect.
C505, C605	352731019	100 μF 10V Elect.
C506	352782219	220 μF 50V Elect.
C507, C607	352764709	47 μF 35V Elect.
C509	352782219	220 μF 50V Elect.
C512, C514	352781009	10 μF 50V Elect.
C901	3500065A	ΔDE7150FZ103P AC400V/125V JS
C902, C903	3504171	6,800 μF 40V Elect.
C904, C905	352744719	470 μF 16V Elect.
C906	352761019	100 μF 35V Elect.
C907	352752229	2,200 μF 25V Elect.
C908	352751019	100 μF 25V Elect.
C911	352780109	1 μF 50V Elect.
C510, C912	352751009	10 μF 25V Elect.
C913	352753309	30 μF 25V Elect.
C914	352780339	3.3 μF 50V Elect.
Resistors		
R506	441521014	100ohm, 1/2W, Metal oxide film
R507, R607	441523324	3.3kohm, 1/2W, Metal oxide film
R508, R608	441523324	3.3kohm, 1/2W, Metal oxide film
R509, R609	441520474	4.7ohm, 1/2W, Metal oxide film
R510	441521014	100ohm, 1/2W, Metal oxide film
R512, R612	441520474	4.7ohm, 1/2W, Metal oxide film
R901, R902	441628214	820ohm, 1W, Metal oxide film
R903	441621024	1kohm, 1W, Metal oxide film
R904	441521204	12ohm, 1/2W, Metal oxide film
R911	441522704	27ohm, 1/2W, Metal oxide film
R913	431523355	Δ3.3Mohm, 1/2W, Solid <D>
R990	441520104	1ohm, 1/2W, Metal oxide film <D>
Relay		
RL901	25065108	NRL-2P3A-DC24-05
Switch		
S901	25035398	ΔNPS-111-L362P Power
P501	25060093	NTM-8P-DML-34 Speaker <D/W>
	25060094	NTM-8P-DML-35 Speaker <G>
	25060094	Fuseholders
F501	250113	ΔSN5051 <D/W>
	25060065	ΔYSH403T <G/W>
	25060268	Sockets
Radiator	25060268	NSCT-4P-96
	25060269	NSCT-5P-97
	27160176	RAD-56
Screw		
Brackets	82143006	3P+6F(B/C) Pan head screw
	27141059	Ground <D>
	25060092	NTM-1S33 <G/W>
Label		
Fuses	25360626-1	Fuse <D>
	25360405	T2.5A/250V Fuse rating <G>
	252048	Δ3A(ST-6) Primary <D>
F901	252073	Δ1.6A-SE-EAK Primary <G/W>
F902	252077	Δ4A-SE-EAK Secondary <G>
F903, F904	252070	Δ1A-SE-EAK Secondary <G>
F905	252059	Δ4A(SS-2) Speaker <D/W>
F501, F601	252075	Δ2.5A-SE-EAK Speaker <G>

NOTE: <D> Only 120V model
<G> Only 220V and 240V models
<W> Only Worldwide model

SCHEMATIC DIAGRAM

-G/Q models-



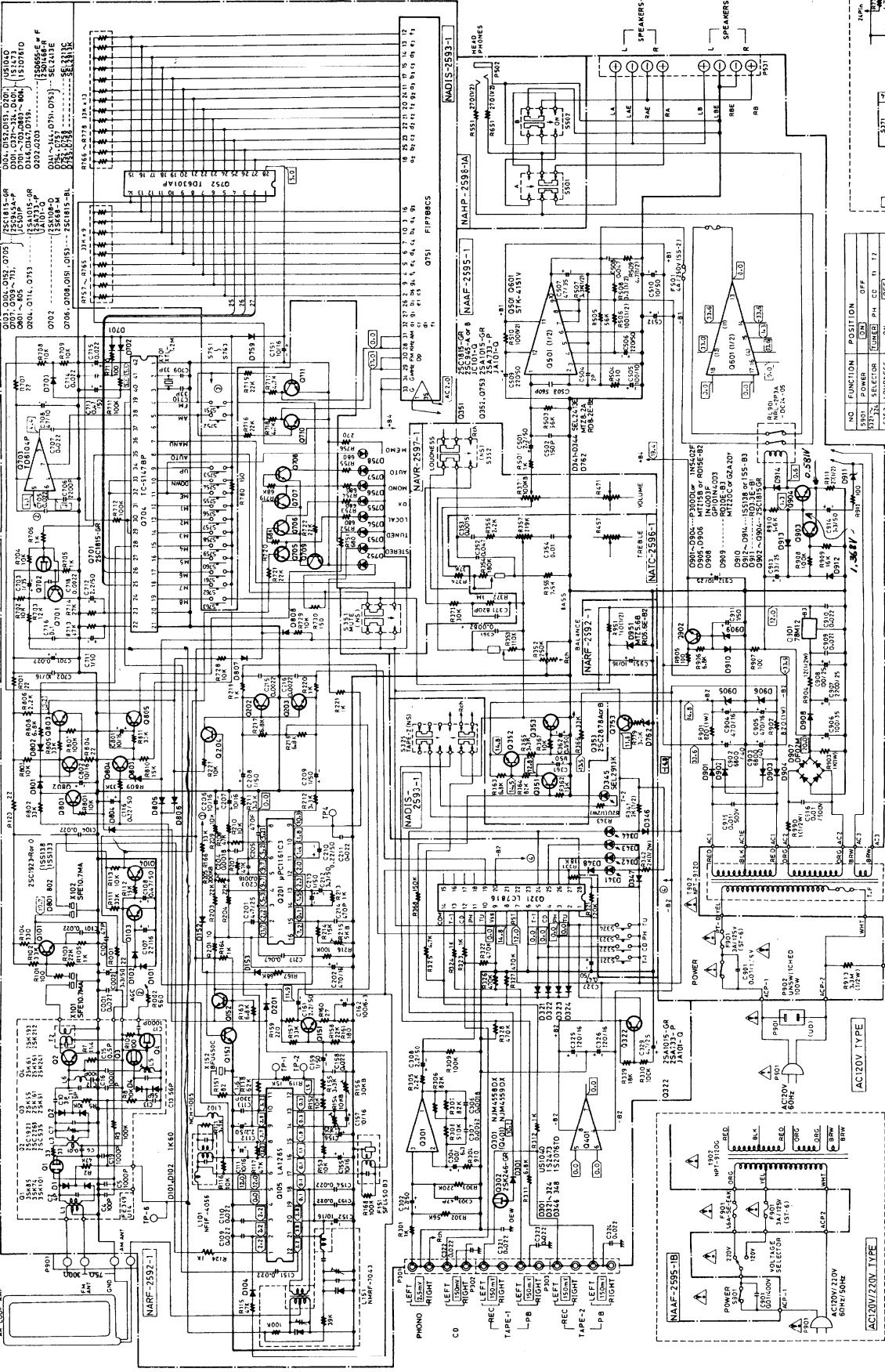
NOTES

- ALL RESISTORS ARE IN OHMS UNLESS OTHERWISE SPECIFIED.
- ALL CAPACITORS ARE IN P.F. UNLESS OTHERWISE SPECIFIED.
- ELECTRONIC CAPACITORS ARE IN P.F. UNLESS OTHERWISE SPECIFIED.
- THE COMPONENTS IDENTIFIED BY MARK "A" ARE CRITICAL FOR SAFETY. REPLACE ONLY WITH PART NUMBER SPECIFIED.

NO.	FUNCTION	POSITION	OFF
100	POWER	ON	OFF
101	REVERSE	ON	OFF
102	REVERSE	ON	OFF
103	REVERSE	ON	OFF
104	REVERSE	ON	OFF
105	REVERSE	ON	OFF
106	REVERSE	ON	OFF
107	REVERSE	ON	OFF
108	REVERSE	ON	OFF
109	REVERSE	ON	OFF
110	REVERSE	ON	OFF
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194	REVERSE	ON	OFF
195	REVERSE	ON	OFF
196	REVERSE	ON	OFF
197	REVERSE	ON	OFF
198	REVERSE	ON	OFF
199	REVERSE	ON	OFF
200	REVERSE	ON	OFF

SCHEMATIC DIAGRAM

-D/W models-



NOTES
1. ALL COMPONENTS ARE IN OHMS UNLESS OTHERWISE NOTED.
2. ALL CAPACITORS ARE IN P.F. UNLESS OTHERWISE NOTED.
3. VOLTAGE MEASURED WITH V.T.A. (NO INPUT SIGNAL).
4. RESISTANCE MEASURED WITH V.T.A. (NO INPUT SIGNAL).
5. RES. USE ONLY WITH INPUT SIGNALS INDICATED.

TABLE OF COMPONENT VALUES

NO.	FUNCTION	POSITION	VALUE	UNIT
5001	POWER	ON	100K	Ω
5002	SELECTOR	ON	100K	Ω
5003	SELECTOR	OFF	100K	Ω
5004	SELECTOR	ON	100K	Ω
5005	SELECTOR	OFF	100K	Ω

TABLE OF COMPONENT VALUES

NO.	FUNCTION	POSITION	VALUE	UNIT
5006	POWER	ON	100K	Ω
5007	SELECTOR	ON	100K	Ω
5008	SELECTOR	OFF	100K	Ω
5009	SELECTOR	ON	100K	Ω
5010	SELECTOR	OFF	100K	Ω

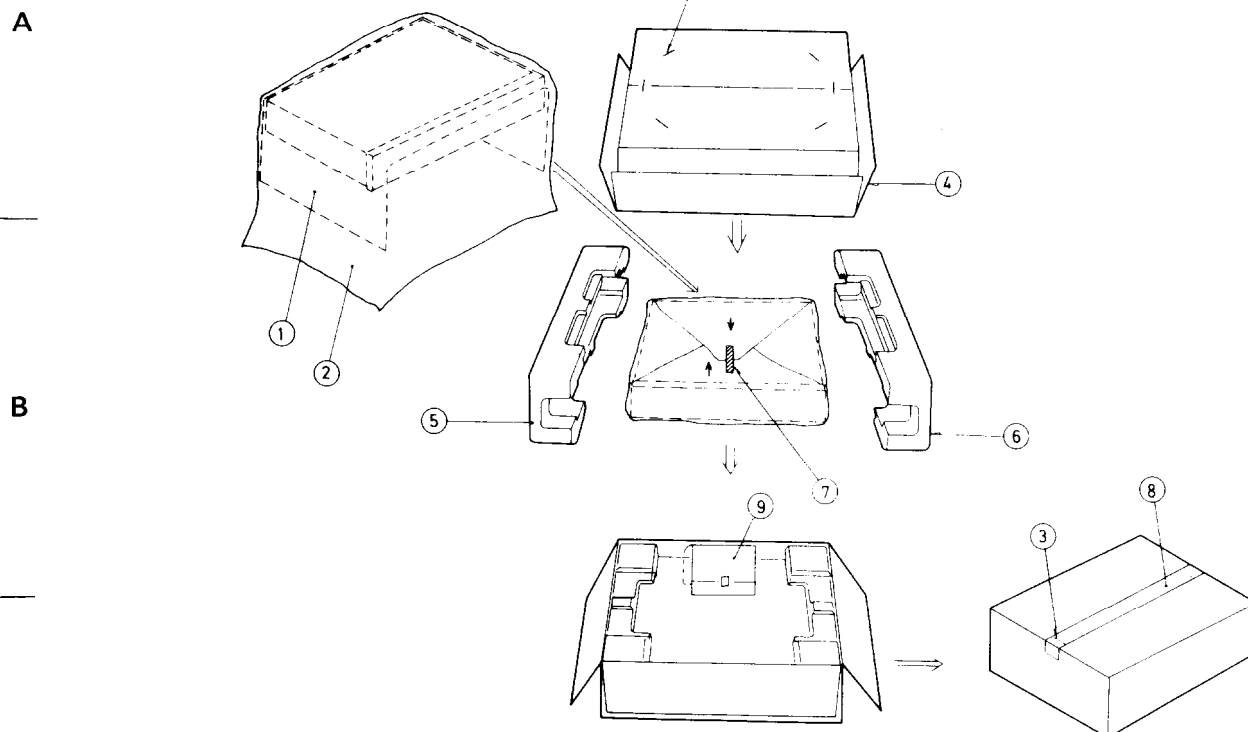
TABLE OF COMPONENT VALUES

NO.	FUNCTION	POSITION	VALUE	UNIT
5011	POWER	ON	100K	Ω
5012	SELECTOR	ON	100K	Ω
5013	SELECTOR	OFF	100K	Ω
5014	SELECTOR	ON	100K	Ω
5015	SELECTOR	OFF	100K	Ω

TABLE OF COMPONENT VALUES

NO.	FUNCTION	POSITION	VALUE	UNIT
5016	POWER	ON	100K	Ω
5017	SELECTOR	ON	100K	Ω
5018	SELECTOR	OFF	100K	Ω
5019	SELECTOR	ON	100K	Ω
5020	SELECTOR	OFF	100K	Ω

PACKING VIEW



REF.NO.	PART NO.	DESCRIPTION
1	29095012-1	500 × 800mm, Protection sheet
2	29100036A	550 × 850mm, Poly-vinyl bag
3	282301	Sealing hook
4	29051285	Master carton box <S>
	29051286	Master carton box
5	29090690C	Pad R
6	29090691B	Pad L
7	29110032	W=15mm, Adhesive tape
8	260012	W=50mm, Damplon tape
9	Accessory bag ass'y	
	U.S.A. model	
	292064A	FM antenna
	29340986	Instruction manual
	232119	NMA-3052, AM loop antenna
	29365006-7	Warranty card
	29368002C	Service station list
	29100006A	250 × 350mm, Poly-vinyl bag

NOTE: : Only black model
<S>: Only silver model

REF.NO.	PART NO.	DESCRIPTION
	120V model	
	292064A	FM antenna
	29340986	Instruction manual
	232119	NMA-3052, AM loop antenna
	29100006A	250 × 350mm, Poly-vinyl bag
	220V model	
	292092	FM antenna
	29340987	Instruction manual
	232119	NMA-3052, AM loop antenna
	29100006A	250 × 350mm, Poly-vinyl bag
	Worldwide model	
	292064A	FM antenna
	29340987	Instruction manual
	232119	NMA-3052, AM loop antenna
	29100006A	250 × 350mm, Poly-vinyl bag
	25055040	CV-K-2, Conversion plug
	240V model	
	292092	FM antenna
	29340987	Instruction manual
	232119	NMA-3052, AM loop antenna
	29100006A	250 × 350mm, Poly-vinyl bag
	25060088	Antenna adaptor FM